

CHAPTER 5

CUMULATIVE IMPACTS ANALYSIS

5.0 INTRODUCTION

Federal regulations define cumulative impacts (40 CFR 1508.7) as:

"...the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

This chapter addresses cumulative impacts as the incremental change in impact which would occur from the Proposed Action and project alternatives in combination with other on-going and recently approved development, recently constructed projects and other past projects, and projects likely to be implemented in the near future (reasonably foreseeable future actions or RFFAs). development. It encompasses all of the proposed activities as well as adjacent lands. About 40 wells have been drilled in the area to date. A description of existing disturbance resulting from past and current oil and gas development has been provided in chapter two of this EIS and is discussed here in terms of cumulative impacts on wildlife, soils, vegetation, range, visual and recreation resources.

The Proposed Action and Alternatives A and B incorporate measures intended to reduce, minimize or avoid adverse impacts on the environment. Mitigation measures which would further reduce adverse impacts have been recommended in chapter four of this EIS. Reclamation guidelines for proposed activities are described in Appendix B. In addition to the environmental protection and mitigation measures described in this EIS, additional measures could be identified in the course of site-specific review of project locations once they have been staked in the field. For example, as part of the Application for Permit to Drill (APD) process, BLM would conduct on-site inspections of proposed well, road and pipeline locations prior to any surface disturbing activity. Site-specific surveys, such as cultural resource surveys, would be completed. Adjustments in the location of project components and/or conditions of approval could be required by the BLM at that time. By minimizing the adverse impacts associated with implementation of the project activities, the incremental increase in adverse impacts would be reduced.

This discussion of cumulative impacts assumes the implementation of environmental protection and mitigation measures discussed in this EIS as well as compliance with the Platte River Resource Area RMP and all applicable federal, state and local regulations and permit requirements. While much of this discussion will focus on cumulative adverse impacts, it should be noted that beneficial, cumulative impacts would also occur. For example, beneficial, cumulative impacts would include increased government royalties and revenues derived from oil and gas production and additional employment opportunities for oil and gas workers in the region.

CHAPTER 5: CUMULATIVE IMPACTS ANALYSIS

5.1 PROPOSED ACTIVITY AND ACTUAL ACTIVITY REASONABLY FORESEEABLE IN THE PROJECT AREA

This EIS incorporates all reasonably foreseeable oil and gas activity in the project area based on current knowledge of energy prices, geology, drilling technology and reservoir management. In practice, however, this knowledge will change over time. For example, currently unknown geologic or reservoir conditions, changes in energy prices and other economic factors could cause far fewer wells to be drilled. Some areas may never be developed. Similarly, the impacts predicted to occur as a result of the Proposed Action and project alternatives are based on current knowledge of resources found in the areas. It is possible, for example, that future changes in federal oil and royalty regulations could affect revenues generated by the project. Production rates from future wells and specific, target formations cannot be predicted very accurately. This could affect the configuration of field production and gas processing equipment. None of these changes are expected to measurably affect the conclusions reached in this EIS. However, federal regulations provide for additional analysis if substantial changes in resource conditions would alter the conclusions reached in this NEPA document.

Oil and gas development is the only major resource development activity currently occurring in the project area and, at this time, it is also the only reasonably foreseeable, resource development activity for the project area. The BLM has not received proposals for any other resource developments such as mines, highways or industrial sites in the project area. Therefore, existing surface disturbance in the project area is associated with road, well pads, and natural gas production facilities.

5.2 GEOLOGY, MINERALS AND PALEONTOLOGY

5.2.1 Geology

Because the Proposed Action and project alternatives would not affect landslide deposits and would be unlikely to trigger geologic hazards such as landslides, mudslides, debris flows, or slumps, no incremental increase in cumulative impacts associated with geologic hazards would occur.

5.2.2 Minerals

Because the Proposed Action and project alternatives would not affect major mineral resources, other than oil and gas reserves, no incremental increase in cumulative impacts to other mineral resources would occur. A beneficial, cumulative impact on government royalty and tax revenues would occur if the Proposed Action or Alternative B were adopted. This impact would be less if Alternative A was adopted.

5.2.3 Paleontological Resources

If the Proposed Action or Alternatives A or B were adopted, the incremental increase in adverse impacts to this resource would be minimized and beneficial impacts would be fostered by the implementation of mitigation and paleontological resource measures described in Chapters 2 and 4 and Appendix E of this EIS. For this reason, implementation of the Proposed Action or

CHAPTER 5: CUMULATIVE IMPACTS ANALYSIS

Alternatives A or B is not expected to increase cumulative impacts associated with the loss of scientifically significant paleontological resources but could have a positive, cumulative impact on knowledge of paleontological resources in the area. Lacking the benefit of these measures, implementation of Alternative C could result in an increase in cumulative impacts.

5.3 AIR QUALITY

The assessment of air quality impacts has considered cumulative impacts from the standpoint of assessing the potential impacts from all existing, reasonably foreseeable and proposed sources of emissions. It was found that although some deterioration of air quality would occur (and would be unavoidable), potential impacts would not be significant. Long-term, cumulative air quality degradation would be due primarily to direct carbon monoxide and nitrogen dioxide emissions (and potential secondary ozone formation) from compression, dehydration, separation and storage tank operations. In brief, the analysis produced the following conclusions about cumulative impacts:

- Construction and operations would not cause an exceedance of National Ambient Air Quality Standards or Wyoming Ambient Air Quality Standards; and,
- Pollutant concentrations from individual sources required for oil and gas operations would not significantly "overlap" even where well spacing reached the maximum density. In other words, ground level concentrations of air pollutants would be localized around a well site such that installing additional wells in the field would not produce overlapping, cumulative concentrations of emissions.

The conservative, "worst case" emission assumptions used in the air quality analysis have defined an extreme, upper limit estimate of potential emissions. A review of current production activities in the project area suggested that, in actual operations, this level of emissions and potential impact would not be reached or exceeded. For example, the worst case analysis assumed that all of the potential well sites would be producing--that is, there would be no dry holes when it is very likely that some wells would be either dry or uneconomical to produce. The analysis assumed that all producing wells would be operational for 10 to 20 years. In reality, the productive life of a well could be much less and, in any case, production rates would not be constant over this period. Finally, the analysis assumed that all production activity would occur at the maximum possible emission rate and that this rate would be sustained continuously over the life of the field. In reality, emission rates would be variable. Equipment would seldom be operated continuously at a maximum capacity. And emissions would vary under different production scenarios. Considering these assumptions, the analysis has produced an extreme, upper-bound estimate of potential air quality impacts that, in reality, would not be reached during implementation of the proposed activities.

Another factor mitigates against reaching this upper-bound estimate as well. Before emission sources could be constructed, the Wyoming Department of Environmental Quality (WDEQ) would require the project proponents to submit applications for air quality permits. These applications would address expected emissions from specific project components such as compressors. Additional site-specific air quality analysis and emission control measures could be required to ensure protection of air quality and compliance with applicable federal and state regulations.

CHAPTER 5: CUMULATIVE IMPACTS ANALYSIS

Considering this oversight, the possibility of reaching the "worst-case" emission scenario is reduced even further.

Nonetheless, due to public concerns about potential air quality impacts, an assessment of cumulative impacts was also performed to predict potential, cumulative air quality impacts at the Cloud Peak Class II Wilderness area to:

- calculate potential nitrate and sulfate deposition (and related water chemistry impacts) in sensitive lakes; and,
- to address potential changes in regional visibility.

Two groups of sources were considered:

- emissions from the Proposed Action and Alternative well field development; and,
- sources considered as "Permitted but not Operational", including:

Larry's Inc. Asphalt Plant - Sheridan County
Rissler & McMurry Co. - Natrona County
Texaco Compressor Engine - Big Horn County
Texaco 3 Oil Heaters - Big Horn County
Texaco Glycol Dehydrator - Big Horn County
Kaycee Bentonite Ore Dryer - Natrona County

It is possible that these facilities may never become operational and add to cumulative impacts on air quality. However, in the interest of considering a "worst-case" scenario they were incorporated into this analysis.

It is important to consider the level of conservatism factored into this analysis when reviewing the modeling results. The projected impacts reflect "screening" level modeling—a modeling approach that is conservative by design. Therefore if the modeling shows impacts less than the significance criteria, there is no need to perform a more refined analysis. The following, conservative assumptions have been incorporated into the analysis of impacts on the Cloud Peak Class II Wilderness Area:

- All sources were assumed to be operating simultaneously and continuously at the highest rate of emissions possible. Given the number of sources included in this analysis (approximately 180), the probability of such an emissions scenario occurring over a 24-hour time period or an entire year is extremely small. While this assumption is typically used in such modeling analyses, the resulting impacts will be overstated. It should be noted that as the number of sources increases, the level of conservatism also increases.
- The ISCST3 model assumes instantaneous, straight-line transport of the plume. In other words, the model does not account for the actual travel time, distance, nor the non-linear path a plume would actually follow as it traveled from a source to the Cloud Peak Class II Wilderness Area. Due to this assumption, the model significantly overestimates the number of times a plume would actually reach the wilderness area. Also, because the model

CHAPTER 5: CUMULATIVE IMPACTS ANALYSIS

cannot predict the varying route, the concentration of an actual plume is overstated. This limitation is not very important for near-field assessments but for plume distances greater than 50 kilometers, the assumption becomes very conservative.

- The ISCST3 model also conservatively addresses plume transport for large elevation increases (3000 feet) in complex terrain. Even though a trajectory could transport the plume toward the Cloud Peak Class II area, it is doubtful that it would climb 3000 feet necessary to reach the sensitive area.

Since there are no federal or state atmospheric deposition or visibility protection regulations for a Class II wilderness area or for wilderness study areas (WSAs), the air quality impact assessment did not estimate potential impacts at BLM-administered WSAs. However, at the request of the USDA-Forest Service, estimates of potential atmospheric deposition and visibility impacts were made for the Cloud Peak Class II Wilderness Area.

Maximum, cumulative, SO₂ and NO₂ concentrations were predicted for Florence Lake located within the Cloud Peak Class II Wilderness Area. This lake was identified by the USDA-Forest Service as sensitive to atmospheric deposition and is one at which data has been collected. Its Acid Neutralizing Capacity, or ANC, has been estimated at 37.6 ueq/l. Atmospheric deposition at Florence Lake was predicted to be 0.0004 kg/ha-yr (nitrogen) and 0.0008 kg/ha-yr (sulfur). This compares to threshold values (Fox et al. 1989) of 3 kg/ha-yr (aquatic nitrogen) and 5 kg/ha-yr (terrestrial sulfur). The potential ANC change at Florence Lake was predicted to be 0.02 percent. The USDA - Forest Service has defined an ANC "limit of acceptable change" as 10 percent for lakes, such as Florence Lake, which have an ANC greater than 25 ueq/l.

Since emissions from the proposed activities would constitute many small sources spread out over a very large area, discrete, visible plumes are not likely to be created or to impact the Cloud Peak Class II Wilderness Area. However, the potential for cumulative visibility impacts--such as increased regional haze and visibility degradation--is a concern. Regional haze is caused by fine particles and gases scattering and absorbing light. Changes to regional haze are measured in terms of visibility differences below background (existing) conditions.

The Interagency Workgroup on Air Quality Modeling (IWAQM) has prepared a very conservative screening method to estimate potential, regional haze impacts (IWAQM 1993). This method involves modeling SO₂, NO₂, and particulate emissions to estimate fine particle concentrations at the area of concern and to compute the potential change in visibility reduction which is defined in terms of "deciview" change. The magnitude of deciview change, its frequency, time of the year and meteorological conditions during times when deciview thresholds are above 1.0, as well as the inherent conservatism of the analyses, must be considered when assessing the significance of potential visibility impacts.

The ISCST3 model was used to estimate the maximum 24-hour and annual average pollutant impacts created by the proposed development at receptors along the boundary of the Cloud Peak Class II Wilderness Area. For this analysis, NO₂ is the only pollutant of concern since sulfur emissions are unlikely during production of the "sweet" gas found in the field.

Background visibility was assumed to be 374 km (Standard Visual Range or SVR) based on data provided by the USDA-Forest Service monitoring program (Blett 1996). This represents a 90th

CHAPTER 5: CUMULATIVE IMPACTS ANALYSIS

percentile, best-case visibility for every day in a year. This is a very conservative assumption as the theoretical maximum, possible visibility is 391 km SVR. Conservative assumptions also were made about plume transport time, the occurrence of a 95 percent relative humidity, and the conversion efficiency of NO_x to ammonium nitrate. Finally, the conservative nature of the analysis was taken one step further by excluding from the baseline condition any sources which are "Permitted but not Operational." This meant that background visibility was assumed to be more clear than it otherwise might be if those already permitted sources were operating.

Using these conservative assumptions, the maximum, predicted deciview reduction was 0.45. Under "real-world," field development conditions it is likely that the actual reduction in visibility would be significantly less. The BLM considers a deciview change of 1.0 as potentially significant. This criteria was proposed by Pitchford and Malm (1994) and has been adopted by the Grand Canyon Visibility Transport Commission. A 1.0 deciview is defined as "about a 10 percent change in extinction coefficient, which is a small but perceptible scenic change under many circumstances." The USDA-Forest Service has established a 0.5 deciview as the "limit of acceptable change" to evaluate potential significant visibility impacts at the Cloud Peak Class II Wilderness Area. There is some disagreement on whether a change of 0.5 deciview is perceptible. But based on either criteria, the Proposed Action and project alternatives would not result in any perceptible visibility impact (even on the cleanest days) at the Cloud Peak Class II Wilderness Area. A very detailed technical support document has also been prepared and is available upon request.

In summary, while an incremental increase in cumulative impacts to air quality would occur as a result of the Proposed Action or project alternatives, the magnitude of this increase would be small and, even under "worst-case" conditions, would not result in the exceedance of any federal or state air quality standard. Despite the incorporation of very conservative assumptions into the analysis, emissions from the Proposed Action and project alternatives would not result in cumulative impacts in excess of USDA-Forest Service criteria for allowable atmospheric deposition and changes in visibility at the Cloud Peak Class II Wilderness Area. The Wyoming Department of Environmental Quality has been granted the authority to monitor cumulative changes in air quality and to implement air pollution controls where necessary to ensure compliance with federal and state air quality standards.

5.4 SOILS

5.4.1 Introduction

Cumulative impacts include impacts from other past and present projects as well as impacts from reasonably foreseeable future projects in the "vicinity" of the project area regardless of what agency or person undertakes such other actions or projects (940 CFR 1508.7). The determination of the "vicinity" of a project is somewhat subjective and depends on the specific resource element of interest. Recent BLM guidance (USDI-BLM 1994) strongly recommends evaluating cumulative impacts on a watershed basis for natural resources related to watershed function and stability. The cumulative impacts analysis (CIA) area for soils includes two components: (1) the project area, and (2) all watersheds that are overlapped by the project area. Figure 5-1 depicts the location and

CHAPTER 5: CUMULATIVE IMPACTS ANALYSIS

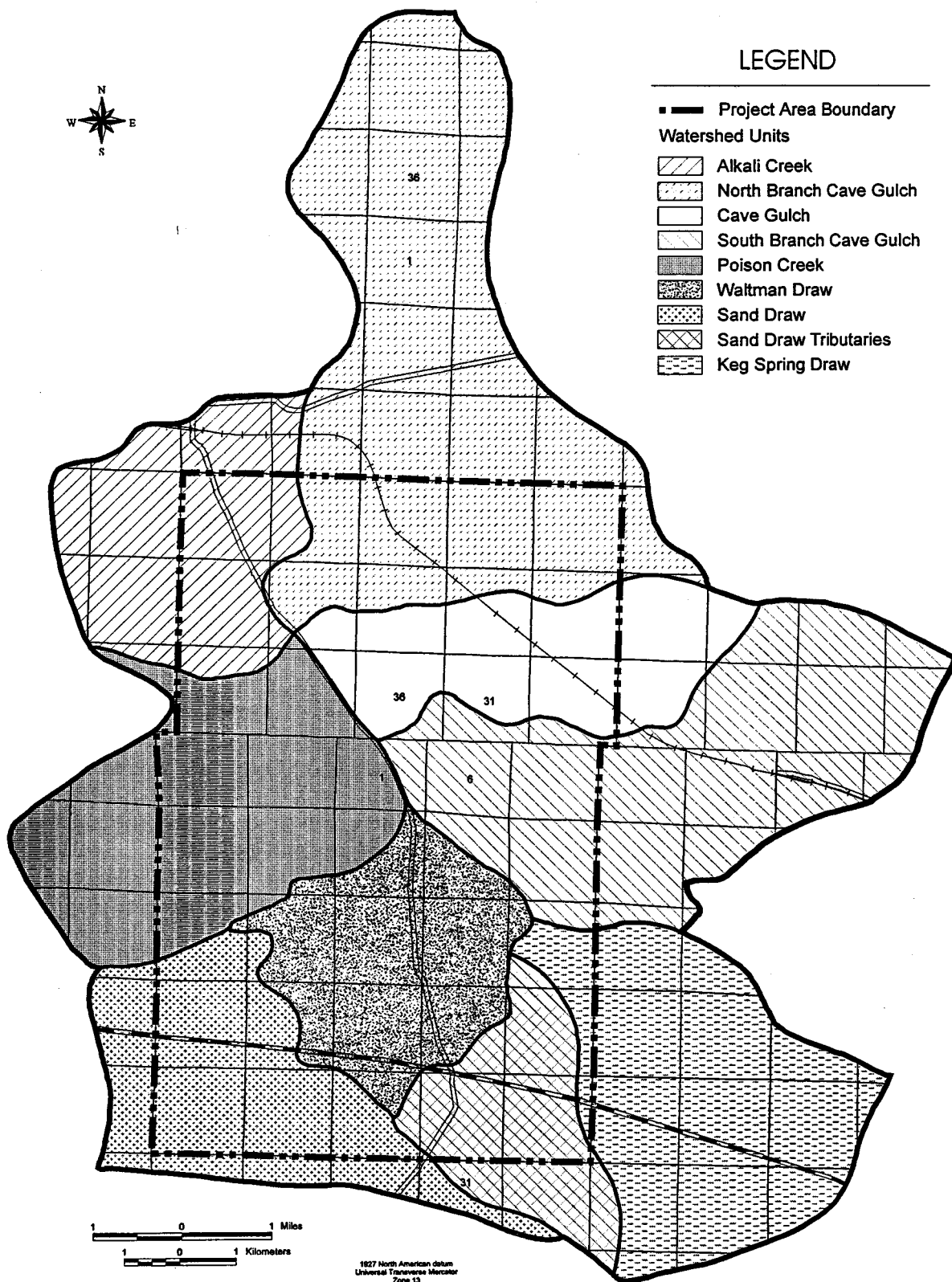


Figure 5-1. Cumulative Impacts Analysis Area and Component Watersheds..

CHAPTER 5: CUMULATIVE IMPACTS ANALYSIS

relationship of the project area and the considered watersheds. A detailed analysis of existing disturbance within the project area and the CIA area is presented in the Soils, Water, and Vegetation Resources Technical Report (ECOTONE 1997). The following significance criteria was used to determine the significance of a cumulative impact:

- The proposed project would increase the total cumulative soil disturbance within the project area to more than a total of 10 percent of a given watershed intersected by the project area, and/or the watersheds comprising the CIA area as shown on Figure 5-1.

The 10 percent threshold is important because at this level of disturbance, watersheds begin to show obvious adverse signs of instability and adjustment (i.e., excessive erosion, slope instability, channel instability, and sedimentation). This would be particularly true for the Cave Gulch drainages where there is a relatively high incidence of sensitive soils that can easily be destabilized resulting in high runoff and erosion rates and poor reclamation success.

5.4.2 Cumulative Impacts within the Project Area

Existing disturbance within the project area was identified, delineated, and mapped using aerial photographs taken in June of 1996. Disturbance areas were delineated and digitized into a Geographic Information System (GIS) for data manipulation and analysis. A detailed analysis of existing disturbance within the project area and the CIA area is presented in the Soils, Water, and Vegetation Resources Technical Report (ECOTONE 1997). Table 3-8 of Chapter 3 summarizes the existing disturbance in the project area, broken out by short-term or construction disturbance and long-term or production disturbance.

Existing disturbance within the project area is approximately 1,041 acres, or 4.2 percent of the 25,093-acre project area. Table 5-1 summarizes the existing disturbance according to type of disturbance (e.g., highway, resource road, well site, pipelines, etc.). The total area of construction disturbance would be reduced in time due to reclamation of disturbance areas not needed for production as well as due to natural site revegetation. Once a well goes into production, the size of the drill pad can be reduced. The unused portion of the drill pad and cut and fill slopes would be reclaimed. All roads would be partially revegetated so that the residual disturbance would be less than the area disturbed during construction. All pipelines are in various stages of reclamation. Therefore, after the initial construction disturbance the total area left unreclaimed is considerably less. Table 5-1 summarizes the reduction in total disturbance after the initial construction. Approximately 452 acres of disturbance would be left unreclaimed in the long term. This represents approximately 1.8 percent of the 25,093-acre project area.

Table 5-2 summarizes the construction phase disturbance in the project area combined with the construction disturbance associated with the Proposed Action by watershed. In the short term, approximately 1,829 acres of disturbance would occur, or 7.3 percent of the project area. The North Branch (7.0 percent), Main Branch (13.5 percent), and South Branch of Cave Gulch (9.7 percent), as well as Waltman Draw (11.1 percent) would be subjected to the highest level of cumulative construction disturbance. Percent disturbance in the other watersheds would range from 3.1 percent to 6.3 percent. The significance threshold would be exceeded in the Main Branch of Cave Gulch and South Branch of Waltman, and would approach 10 percent in the South Branch of Cave Gulch. Thus, in the short term, significant cumulative impacts would result in these watersheds.

Table 5-1. Existing Disturbance by Type and Phase.

Disturbance Type	Project Area				Outer CIA				Total CIA			
	Construction		Long-Term		Construction		Long-Term		Construction		Long-Term	
	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%
Highway	73	7.0	46	10.2	55	7.5	35	9.4	128	7.2	81	9.8
County Road	64	6.1	43	9.5	50	6.8	34	9.1	114	6.4	77	9.3
Collector Road	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Local Road	44	4.2	13	2.9	11	1.5	3	0.8	55	3.1	16	1.9
Resource Road	73	7.0	29	6.4	90	12.2	36	9.6	163	9.2	65	7.9
Two Track Road	112	10.8	112	24.8	126	17.1	126	33.7	238	13.4	238	28.8
Fence lines, Livestock Tracks, Seismic Lines	27	2.6	27	6.0	31	4.2	31	8.3	58	3.3	58	7.0
Railroad	100	9.6	35	7.7	86	11.7	30	8.0	186	10.5	65	7.9
Pipelines	351	33.7	0	0	163	22.1	0	0	514	28.8	0	0
Well Sites	110	10.6	60	13.3	99	13.5	54	14.4	209	11.8	114	13.8
Urban/Industrial	87	8.4	87	19.2	25	3.4	25	6.7	112	6.3	112	13.6
TOTAL	1,041	100.0	452	100.0	736	100.0	374	100.0	1,777	100.0	826	100.0

CHAPTER 5: CUMULATIVE IMPACTS ANALYSIS

Table 5-2. Summary of Existing Disturbance and Disturbance Under the Proposed Action by Phase and Watershed.

Watershed	Project Area										Outer CIA						Total CIA					
	Construction Disturbance					Long-Term Disturbance					Construction			Long-Term			Construction			Long-Term		
	Existing		Proposed		Total	Existing		Proposed		Total	Area		%	Area		%	Area		%	Area		%
	Area	%	Area	%	%	Area	%	Area	%	%	Area	%	%	Area	%	%	Area	%	%	Area	%	%
Alkali Creek	1,801	55.3	0	0	55.3	3.1	21.0	0	0	1.2	21.0	0	0	55	4.0	2.0	112	3.6	3.6	167	3.6	1.7
Poison Creek	4,198	117.6	63.4	1.5	181.0	4.3	43.8	30.21	0.7	1.8	74.0	10	0.5	10	0.5	0.5	191	3.0	3.0	84	1.3	1.3
N. Branch Cave Gulch	3,455	80.1	162.0	4.7	242.1	7.0	43.1	77.21	2.2	3.5	120.3	114	1.4	73	0.9	0.9	356	3.1	3.1	193	1.7	1.7
Main Branch Cave Gulch	3,012	180.1	225.3	7.5	405.4	13.5	84.2	107.4	3.6	6.4	191.6	33	2.6	37	2.9	2.9	440	10.3	10.3	228	5.3	5.3
S. Branch Cave Gulch	2,735	75.5	190.0	7.0	265.5	9.7	36.6	90.57	3.3	4.7	127.2	98	1.8	46	0.8	0.8	364	4.4	4.4	173	2.1	2.1
Waltman Draw	4,209	318.6	147.6	3.5	466.2	11.1	126.9	88.68	2.1	5.1	215.6	0	0.0	0	0.0	0.0	468	11.1	11.1	215	5.1	5.1
Upper Sand Draw	3,074	100.9	0	0	100.9	3.3	45.5	0	0	1.5	45.5	74	4.1	44	2.4	2.4	175	3.6	3.6	90	1.8	1.8
Sand Draw Tributary	2,027	76.1	0	0	76.1	3.8	43.6	0	0	2.2	43.6	71	7.8	41	4.5	4.5	147	5.0	5.0	85	2.9	2.9
Keg Springs Draw	592	36.8	0	0	36.8	6.3	7.5	0	0	1.3	7.5	221	3.8	68	1.2	1.2	258	4.0	4.0	76	1.2	1.2
TOTAL	23,083	1,041.0	783.3	3.1	1,829.3	7.3	452.2	394.0	1.6	3.4	848.2	736	2.6	374	1.3	1.3	2,665	4.8	4.8	1,120	2.1	2.1

CHAPTER 5: CUMULATIVE IMPACTS ANALYSIS

In the long term, the disturbance areas would be reduced as discussed above. Table 5-2 summarizes the cumulative long-term disturbances by watersheds for the existing disturbance combined with the proposed action disturbance. In the long term, approximately 846 acres of disturbance would remain unreclaimed, or 3.4 percent of the project area. The North Branch (3.5 percent), Main Branch (6.4 percent), and South Branch of Cave Gulch (4.7 percent), as well as Waltman Draw (5.1 percent) would be subjected to the highest level of cumulative long-term disturbance. Percent disturbance in the other watersheds would range from 1.2 percent to 2.2 percent. Thus, the significance threshold would not be exceeded in any of the watersheds in the long term.

Table 5-3 summarizes short- and long-term disturbance by sensitive and non-sensitive soil areas. In the short term, approximately 549 acres of sensitive soils would be disturbed by the proposed action combined with 633 acres of existing disturbance in sensitive soils to produce a total of 1,182 acres of disturbance in sensitive soils. In the long term, approximately 275 acres of sensitive soils would be left unreclaimed by the proposed action combined with 262 acres of existing disturbance in sensitive soils to produce a total of 537 acres of disturbance left unreclaimed in sensitive soils. These areas of disturbance in sensitive soils give additional credence and concern to the areas of disturbances by watershed discussed above since most potential watershed problems would result from disturbance in such sensitive soils.

5.4.3 Cumulative Impacts Analysis Area

The geographic area outside the project area but within the CIA area is approximately 28,365 acres in size (see Figure 5-1). This area, combined with the 25,093-acre project area, yields a total CIA area of 53,458 acres. The component CIA areas are shown in Figure 5-1. Existing disturbance in the portion of the CIA area outside of the project area was estimated from June 1996 aerial photographs and other sources of information made available by the BLM. In addition, disturbance from other reasonably foreseeable future projects was estimated for projects located within the CIA area. These projects include the Cooper Reservoir Natural Gas Field (19 wells and associated roads and pipeline disturbances) and the KN Pony Express pipeline. No other future projects identified by the BLM for consideration in the cumulative impacts analysis occur in the CIA area for soils. In addition, approximately 17 existing wells were identified in the outer portions of the CIA area. Table 5-1 summarizes the total area of existing disturbance in the outer portions of the CIA area by disturbance type. Table 5-2 summarizes the existing disturbance in the outer portions of the CIA area by watershed. Approximately 736 acres of construction disturbance has occurred, or would occur from reasonably foreseeable future projects, or 2.6 percent of the 28,365-acre outer CIA area. Existing disturbance is highest for the Sand Draw Tributaries drainage (7.8 percent). In the long term, 374 acres of existing disturbance would be left unreclaimed. Similarly, existing long-term disturbance is highest for the Sand Draw Tributaries drainage (4.5 percent).

Table 5-2 also summarizes the combined disturbances from existing disturbance and disturbance associated with reasonably foreseeable future projects with disturbance from the proposed action. In the short term, 2,565 acres of construction disturbance would occur, or 4.8 percent of the 53,458-acre total CIA area. Waltman Draw (11.1 percent) and the Main Branch of Cave Gulch (13.5 percent) would be subjected to greatest amount of disturbance. Percent disturbance in the other watersheds would range from 3.0 percent to 5.0 percent. The significance threshold would be exceeded in the Main Branch of Cave Gulch and Waltman Draw, and disturbance in the other

CHAPTER 5: CUMULATIVE IMPACTS ANALYSIS

Table 5-3. Summary of Existing Disturbance and Disturbance Under the Proposed Action by Phase and Soil Type.

Soil Class	Project Area										Outer CIA						Total CIA					
	Construction Disturbance					Long-Term Disturbance					Construction			Long-Term			Construction			Long-Term		
	Existing		Proposed		Total	Existing		Proposed		Total	Area		%	Area		%	Area		%	Area		%
	Area	%	Area	%	%	Area	%	Area	%	%	Area	%	%	Area	%	%	Area	%	%	Area	%	%
Sensitive	16,179	63.3	549	69.7	1,182	64.6	262	58.0	275	69.6	537	63.4	63.4	15,801	448	60.9	217	58.0	58.0	1,830	63.6	61.7
Non-Sensitive	8,814	39.1	239	30.3	647	35.4	190	42.0	120	30.4	310	36.6	36.6	12,764	288	39.1	157	42.0	42.0	935	36.4	38.3
TOTAL	25,093	100.0	788	100.0	1,829	100.0	452	100.0	395	100.0	847	100.0	100.0	28,365	736	100.0	374	100.0	100.0	2,565	100.0	100.0

CHAPTER 5: CUMULATIVE IMPACTS ANALYSIS

watersheds would not approach 10 percent. Thus, in the short term, significant cumulative impacts would result in the main Branch of Cave Gulch and Waltman Draw.

In the long term, the disturbance areas would be reduced as discussed above. Table 5-2 summarizes the cumulative long-term disturbances by watersheds for the total CIA area. In the long term, approximately 1,120 acres of disturbance would remain unreclaimed, or 2.1 percent of the total CIA area. The Main Branch of Cave Gulch (5.3 percent) and Waltman Draw (5.1 percent) would be subjected to the highest level of cumulative long-term disturbance. Percent disturbance in the other watersheds would range from 1.2 percent to 2.9 percent. Thus, the significance threshold would not be exceeded in any of the watersheds in the long term. Therefore, significant cumulative impacts would not occur in the long term.

Table 5-3 summarizes short- and long-term disturbance by sensitive and non-sensitive soil areas for the outer portions and the total CIA area. In the short term, approximately 1,630 acres of sensitive soils would be disturbed, including the proposed action. In the long term, approximately 753 acres of sensitive soils would be left unreclaimed, including the proposed action. These areas of disturbance in sensitive soils give additional credence and concern to the areas of disturbances by watershed discussed above since most potential watershed problems would result from disturbance in such sensitive soils. The RMP specifies that a watershed management plan must be developed for the Cave Gulch drainage if the level of disturbance becomes important. The Cave Gulch watershed should be evaluated to determine the need for intensive management. Intensive management may include requirements for a watershed plan, implementation of various protective measures, and placement of various structures as may be necessary.

Cumulative impacts under Alternatives A and B would be similar to those described for the Proposed Action as described in greater detail in the Soils, Water, and Vegetation Resources Technical Report (ECOTONE 1997). With effective reclamation itemized in Section 4.3.5 and as defined in Appendix B, residual disturbances would be well below the ten percent threshold overall for the CIA area.

5.5 WATER RESOURCES

Watersheds were used as the basic unit of comparison for soils. As such, the analysis presented under soils covers most of the potential concerns for water resources. The same significance criteria listed above for soils applies to water resources.

As summarized in Table 5-2, existing construction disturbance within the project area ranges from a low of 2.3 percent for the North Branch Cave Gulch watershed to a high of 7.6 percent for Waltman Draw. This indicates that existing disturbance is not uniformly distributed across the project area. Following reclamation, residual long-term disturbance within the various watersheds ranges from a low of 1.0 percent for Poison Creek to 3.0 percent for Waltman Draw. Combining all disturbance in the short term in the CIA area, the main Branch of Cave Gulch (10.3 percent) and Waltman Draw (11.1 percent) would be subjected to the greatest disturbance and these percentages would exceed the 10 percent threshold. Thus, in the short term, cumulative impacts would be significant. However, with successful reclamation and taking into consideration that most existing disturbances have been reclaimed to various degrees, the highest long-term disturbances in the Main Branch of Cave Gulch (5.3 percent) and Waltman Draw (5.1 percent) would not exceed

CHAPTER 5: CUMULATIVE IMPACTS ANALYSIS

the 10 percent threshold. Therefore, in the long term, cumulative impacts would not be significant. Cumulative impacts under Alternatives A and B would be similar to those described for the Proposed Action as described in greater detail in the Soils, Water, and Vegetation Resources Technical Report (ECOTONE 1997). With effective reclamation itemized in Section 4.3.5 and as defined in Appendix B, residual disturbances would be well below the ten percent threshold overall for the CIA area.

No serious groundwater pollution problems have been detected in the CIA area. Current oil and gas exploration and development activities must comply with federal and State environmental quality laws and, thus, serious water quality and quantity impacts are not expected on a cumulative scale. This is particularly true given Onshore Oil and Gas Order No. 2 and the recent BLM guidelines that direct well completion techniques that reduce the potential for groundwater contamination. Total demand for water in the CIA area is not likely to exceed supply depending on the rate at which the water is extracted or used as discussed in Chapter 4.

5.6 VEGETATION AND WETLANDS

5.6.1 Introduction

Vegetation resources, being a parameter of a watershed, uses the same CIA area as identified for Soils and Water Resources in Figure 5-1. The following significance criteria was used to determine the significance of a cumulative impact:

- The proposed project would increase the total cumulative disturbance within each vegetation cover type to more than a total of 10 percent of a given cover type in the project area, and/or in the CIA area as shown on Figure 5-1.

5.6.2 Cumulative Impacts in the Project Area

As discussed in Sections 3.3, 4.3, 4.5, and 5.4, existing cumulative construction disturbance within the project area is approximately 1,041 acres (4.2 percent of 25,093-acre project area). Table 5-1 breaks out the existing disturbance by type (e.g., roads, well sites, pipelines, etc.). Table 5-4 summarizes disturbances within the project area by cover type. Existing construction disturbance involves 4.3 percent of the mixed desert scrub, 6.3 percent of alkali bottomlands, 3.1 percent of badlands, and 6.1 percent of aquatic habitats. In the case of alkali bottomlands and aquatic habitats, the assessed disturbance values are based on an assumption of 2 percent of the total mixed desert scrub disturbance area. Thus, in the short term, cumulative construction disturbance does not exceed the 10 percent significance threshold and would not be significant. In the long term, cumulative disturbance is approximately 1.9 percent of the mixed desert scrub, 2.3 percent of alkali bottomlands, 1.2 percent of badlands, and 2.3 percent of aquatic habitats, and these impacts would not be significant.

Under the Proposed Action, 788 acres of vegetation would be cleared during the construction phase. Approximately 2.7 percent of the mixed desert scrub, 2.2 percent of alkali bottomlands, 5.8 percent of badlands, and 2.1 percent of aquatic habitats would be disturbed during construction. Combined with existing disturbance, approximately 7.0 percent of the mixed desert scrub, 8.5 percent of alkali bottomlands, 9.0 percent of badlands, and 8.1 percent of aquatic habitats would

CHAPTER 5: CUMULATIVE IMPACTS ANALYSIS

Table 5-4. Summary of Existing Disturbance and Disturbance Under the Proposed Action by Phase and Vegetation Type.

Vegetation Cover Type	Project Area												Outer CIA						Total CIA					
	Construction Disturbance												Long-Term Disturbance						Total CIA					
	Existing		Proposed		Total		Existing		Proposed		Total		Total Area	Construction		Long-Term Area	Long-Term %	Total Area	Construction		Long-Term Area	Long-Term %		
	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%		Area	%				Area	%			Area	%
Mixed Desert Scrub	21,204	903.9	4.3	580.4	2.7	1,484.3	7.0	401.7	1.9	290.1	1.4	691.8	3.3	25,244	639.1	2.5	332.3	1.3	46,448	2,123	4.6	1,024	2.2	
Alkali Bottomlands	248	15.6	6.3	5.4	2.2	21.0	8.5	5.8	2.3	2.7	1.1	8.5	3.4	1,135	11.0	1.0	4.8	0.4	1,383	32.0	2.3	13	0.9	
Badlands	3,383	105.9	3.1	197.2	5.8	303.1	9.0	38.9	1.2	98.5	2.9	137.4	4.1	1,702	74.9	4.4	32.2	1.9	5,085	378.0	7.4	170	3.3	
Aquatic Habitats	258	15.6	6.1	5.4	2.1	21.0	8.1	5.8	2.3	2.7	1.1	8.5	3.3	284	11.0	3.9	4.8	1.7	542	32.0	5.9	13	2.4	
TOTAL	25,093	1,041.0	4.2	788.4	3.1	1,829.4	7.3	452.2	1.8	394.0	1.6	846.2	3.4	28,366	736	2.6	374	1.3	53,458	2,565	4.8	1,220	2.3	

CHAPTER 5: CUMULATIVE IMPACTS ANALYSIS

be disturbed during the construction phase, none of which would be considered a significant impact based on the ten percent threshold. However, the cumulative construction disturbance for badlands and alkali bottomland habitats approach the ten percent threshold.

With reclamation as discussed in Sections 4.3 and 5.4, long-term disturbance would be substantially less and would involve approximately 3.3 percent of the mixed desert scrub, 3.4 percent of alkali bottomlands, 4.1 percent of badlands, and 3.3 percent of aquatic habitats, none of which would be considered a significant impact.

5.6.3 Cumulative Impacts Analysis Area

Table 5-4 shows the short- and long-term disturbance for the total CIA area by cover type. In the short term, approximately 4.6 percent of the mixed desert scrub, 2.3 percent of alkali bottomlands, 7.4 percent of badlands, and 5.9 percent of aquatic habitats would be disturbed, none of which would be considered a significant impact. With reclamation, long-term disturbance would involve approximately 2.2 percent of the mixed desert scrub, 0.9 percent of alkali bottomlands, 3.3 percent of badlands, and 2.4 percent of aquatic habitats, none of which would be considered a significant impact.

The above analysis is based on general vegetation cover types and the 10 percent significance threshold. The loss of wetlands and other aquatic habitats as well as populations and/or sui habitat of special status species, as well as the increase of weeds in the project/CIA areas could cause significant cumulative impacts. Any unpermitted impact to waters of the U.S. associated with this project or other projects in the vicinity or region would add to the cumulative loss of these important areas despite the impact being below the ten percent threshold. The historical loss of wetlands in the U.S. has been well documented as a major environmental problem. The total area of wetlands loss in the U.S. (lower 48 states) is not accurately known but is believed to exceed 90,000,000 acres--nearly half of the estimated original base. Of this total, 87 percent was due to agricultural conversion, eight percent due to urban development, and five percent due to other causes including mining and transportation (Dahl and Pywell 1989). Within Wyoming, there has been an approximate 38 percent loss of wetlands. With regard to the project area, application for a U.S. Army Corps of Engineers 404 permit and measures prescribed in Chapter 2 and Sections 4.3, 4.4, and 4.5 would remove the potential for significant cumulative impacts to these areas. No significant cumulative impacts would occur to special status plants within the analysis area upon implementation of the proposed and recommended mitigation measures. Such measures would involve site-specific surveys performed for special status plants and their habitat prior to earth-surface disturbance at a facility location. If found, impacts to special status plants should be minimized and monitored. Minor adjustments could be made to the location of project facilities to avoid species and/or their habitat.

Similarly, any existing disturbance and new disturbance are ideal places for weeds to invade and become established. Therefore, the potential adverse effects of this project on weed invasion and establishment must be considered in all aspects of planning, construction, reclamation, and field production. Weed monitoring should occur for species identified by the State of Wyoming as well as for additional species specified by Natrona County during a given year. Should such weed species be found during monitoring, control and eradication efforts should be implemented following County control procedures. Further, construction contractors should be required to clean vehicles and equipment of weed seed prior to traveling into the project area.

CHAPTER 5: CUMULATIVE IMPACTS ANALYSIS

Cumulative impacts under Alternatives A and B would be similar to those described for the Proposed Action as described in greater detail in the Soils, Water, and Vegetation Resources Technical Report (ECOTONE 1997). With effective reclamation itemized in Section 4.3.5 and as defined in Appendix B, residual disturbances would be well below the ten percent threshold in all cover types in the CIA area.

5.7 RANGE RESOURCES

Existing land management and use activities that have affected the analysis area to varying degrees include livestock grazing, road construction and maintenance, construction of other well sites and pipelines. Surface disturbance and loss of vegetation associated with implementation of the Proposed Action or project alternatives would increase these cumulative impacts on range resources. However, the incremental increase in short-term impacts over existing impacts would be small—equivalent to the rangeland needed to support approximately eight cows and calves for one year. Following reclamation, the incremental increase in long-term loss of rangeland would be less—equivalent to the range needed to support about four cows and calves for one year. These figures do not consider the reduction in cumulative impacts on rangeland resources that would occur as existing or proposed facilities are eventually abandoned. Given the actions and measures proposed by the operators (see Chapter 2) and stipulations contained in the Platte River Resource Area RMP (USDI-BLM 1985), cumulative loss of forage due to disturbance or invasion by noxious weeds is expected to be minimal.

5.8 WILDLIFE

As shown in 3-8, a total of 1,041 acres of disturbance exist on the project area. Approximately 589 acres of the 1,041 acres of existing disturbance are in various stages of revegetation. The balance (post-reclamation disturbance) is 452 acres. Post reclamation disturbance under the Proposed Action would add 394.0 acres over the long term and bring the cumulative disturbance within the project area to 846 acres. Under Alternative A the amount of post-reclamation disturbance would add 307 acres to the existing disturbance, bringing the total cumulative post-reclamation disturbance to 759 acres. Under Alternative B the amount of post-reclamation disturbance would add 348 acres to the existing disturbance, bringing the total cumulative post-reclamation disturbance to 836 acres. Probable actions under Alternative C would be likely to result in the same post reclamation disturbance as the Proposed Action (394.0 acres) which would bring the cumulative disturbance within the project area to 800 acres.

5.8.1 Pronghorn Antelope

Proposed Action - A total of 788 acres of badlands and mixed desert scrub habitats would be initially disturbed as a result of the Proposed Action within the 863,744 acres occupied by the North Natrona pronghorn herd unit. Of the 788 acres of disturbance, 725 are within pronghorn range designated as yearlong. This 725-acre disturbance represents 0.14% of the total of 509,824 acres of yearlong range that occurs within the North Natrona Pronghorn Herd Unit. The other 63 acres of disturbance occur within winter/yearlong habitats of the Badwater and Beaver Rim Herd Units and constitutes 0.01% of the 706,880 acres of this habitat type that occurs within these two units. No crucial pronghorn habitats, including crucial winter range, will be disturbed in any of the

CHAPTER 5: CUMULATIVE IMPACTS ANALYSIS

herd units. Successful reclamation will reduce disturbed pronghorn habitat to 394 acres. Pre-/post-reclamation disturbances of the project, when combined with the existing post-reclamation disturbances, are 1,108/745 acres within yearlong habitat and 132/101 acres for winter yearlong habitat (Table 5-8).

Alternative A - A total of 670 acres of badlands and mixed desert scrub habitats would be initially disturbed, as a result of implementation of Alternative A, within the 863,744 acres occupied pronghorn by within the North Natrona Herd Unit. Of the 670 acres of disturbance, 610 are within pronghorn range designated as yearlong. This 610 acre disturbance represents 0.12% of the total of 509,824 acres of yearlong range that occurs within the North Natrona Pronghorn Herd Unit. The other 60 acres of disturbance occur within winter/yearlong habitats of the Badwater and Beaver Rim Herd Units and constitutes 0.01% of the 706,880 acres of this habitat type that occurs within these two units. No crucial winter range, or any other crucial pronghorn habitats, will be disturbed in any of the herd units. Successful reclamation will reduce disturbed pronghorn habitat to 307 acres. Pre-/post-reclamation disturbances of the project, when combined with the existing post-reclamation disturbances, are 992.5/662 acres within yearlong habitat and 129.5/97 acres for winter yearlong habitat (Table 5-8).

Alternative B - A total of 769 acres of badlands and mixed desert scrub habitats would be initially disturbed, as a result of implementation of Alternative B, within the 863,744 acres occupied by pronghorn within the North Natrona Herd Unit. Of the 769 acres of disturbance, 707 are within pronghorn range designated as yearlong. This 707 acre disturbance represents 0.14% of the total of 509,824 acres of yearlong range that occurs within the North Natrona Pronghorn Herd Unit. The other 62 acres of disturbance occur within winter/yearlong habitats of the Badwater and Beaver Rim Herd Units and constitutes 0.01% of the 706,880 acres of this habitat type that occurs within these two units. No crucial winter range, or any other crucial pronghorn habitats, will be disturbed in any of the herd units. Successful reclamation will reduce disturbed pronghorn habitat to 348 acres. Pre-/post-reclamation disturbances of the project, when combined with the existing post-reclamation disturbances, are 1,088/701 acres within yearlong habitat and 133/99 acres for winter yearlong habitat (Table 5-8).

Alternative C

Under the No-Action Alternative the consideration of individual APDs on public lands on a case by case basis would be allowed through site-specific environmental analysis. Additional gas development could occur on State and private mineral estate within the project area under APDs approved by the WOGCC. Therefore, essentially the same levels of development as described under the Proposed Action and Alternative B would be allowed under the No Action Alternative and impacts would be comparable to these alternatives .

Because of the small proportions of non-crucial range that will be disturbed and the reclamation reduction of post-construction disturbance by approximately 55%, cumulative impacts to pronghorn resulting from the Proposed Action, Alternative A, and Alternative B are expected to be very minor and non-significant.

At the end of the 30 to 40-year life of the well field, a well-developed mosaic of scrub stands would be present on an estimated 50-55 percent of the disturbed area and would be fully functional as pronghorn winter range. In the absence of supplemental planting, the development of the

CHAPTER 5: CUMULATIVE IMPACTS ANALYSIS

remaining 45-50 percent of the disturbed area into functional pronghorn yearlong and winter/yearlong ranges is likely to take an additional 10 to 15 years of post reclamation time. Under the Proposed Action or Alternative A or B, restoration of pronghorn yearlong and winter/yearlong ranges losses to their pre-disturbance condition would take approximately 50 years. This restoration period could be shortened substantially by early supplemental planting of shrubs in areas not scheduled for disturbance.

5.8.2 Mule Deer

Proposed Action - A total of 717 acres of badlands and mixed desert scrub habitats would initially be disturbed as a result of the Proposed Action within the 848,768 acres occupied by mule deer within the North Natrona Herd Unit. All 717 acres of disturbance, are within mule deer range designated as winter/yearlong. This 717-acre disturbance represents 0.4% of the total of 176,448 acres of winter/yearlong range and 0.08% of the 848,768 acres of occupied range that occurs within the North Natrona mule deer herd unit. All of the 848,768 acres within the North Natrona mule deer herd unit are classified as some type of winter range (WGFD 1996a). No crucial winter range, or any other crucial mule deer habitats, will be disturbed in any of the herd units. Successful reclamation will reduce disturbed mule deer habitat to 358.5 acres. Pre-/post-reclamation disturbances of the project, when combined with the existing post-reclamation disturbances, are 962/603.5 acres within winter/yearlong habitat (Table 5-8).

Alternative A - A total of 603 acres of badlands and mixed desert scrub habitats would initially be disturbed, as a result of implementation of Alternative A, within the 848,768 acres occupied by mule deer within the North Natrona Herd Unit. All the 603 acres of disturbance, are within mule deer range designated as winter/yearlong. This 603 acre disturbance represents 0.34% of the total of 176,448 acres of winter/yearlong range and 0.07% of the 848,768 acres of occupied range that occurs within the North Natrona mule deer herd unit. All of the 848,768 acres within the Northern Natrona mule deer herd unit are classified as some type of winter range (WGFD 1996a). No crucial winter range, or any other crucial mule deer habitats, will be disturbed in any of the herd units. Successful reclamation will reduce disturbed mule deer habitat to 276 acres. Pre-/post-reclamation disturbances of the project, when combined with the existing post-reclamation disturbances, are 848/521 acres within winter/yearlong habitat (Table 5-8).

Alternative B - A total of 669 acres of badlands and mixed desert scrub habitats would initially be disturbed, as a result of implementation of Alternative B, within the 848,768 acres occupied by mule deer within the North Natrona Herd Unit. All the 669 acres of disturbance, are within mule deer range designated as winter/yearlong. This 669 acre disturbance represents 0.38% of the total of 176,448 acres of winter/yearlong range and 0.08% of the 848,768 acres of occupied range that occurs within the North Natrona mule deer herd unit. All of the 848,768 acres within the North Natrona mule deer herd unit are classified as some type of winter range (WGFD 1996a). No crucial winter range, or any other crucial mule deer habitats, will be disturbed in any of the herd units. Successful reclamation will reduce disturbed mule deer habitat to 303 acres. Pre-/post-reclamation disturbances of the project, when combined with the existing post-reclamation disturbances, are 914/548 acres within winter/yearlong habitat (Table 5-8).

CHAPTER 5: CUMULATIVE IMPACTS ANALYSIS

Alternative C

Under the No-Action Alternative the consideration of individual APDs on public lands on a case by case basis would be allowed through site-specific environmental analysis. Additional gas development could occur on State and private mineral estate within the project area under APDs approved by the WOGCC. Therefore, essentially the same levels of development as described under the Proposed Action and Alternative B would be allowed under the No Action Alternative and impacts would be comparable to these alternatives .

At the end of the 30 to 40-year life of the well field, a well-developed mosaic of shrub stands would be present on an estimated 50-55 percent of the area and would be fully functional as mule deer winter range. In the absence of supplemental planting, the development of the remaining 45-50 percent of the area into functional mule deer winter/yearlong range is likely to take an additional 10 to 15 years of post reclamation time. Under either the Proposed Action or Alternative A or B, restoration of mule deer winter/yearlong range losses to their pre-disturbance condition would take approximately 50 years. This restoration period could be shortened substantially by early supplemental planting of shrubs in areas not scheduled for disturbance.

Because of the small proportions on non-crucial range that will be disturbed and the reclamation reduction of post-construction disturbance by approximately 50-55 percent cumulative impacts to mule deer resulting from the Proposed Action, Alternative A, and Alternative B are expected to be very minor and non-significant.

5.8.3 Sage Grouse

Because good sagebrush/grassland habitats are generally absent from the project area and there is no evidence that sage grouse nesting or leks occur there, cumulative impacts to this species are not expected.

5.8.4 Raptors

Background - Introduction

Estimates of potential cumulative effects are based on the best existing information available for the project area and an extended area surrounding it. The activity status of raptor nests was determined over a 273-square-mile area, that included the project area, by locating and inspecting raptor nests from a helicopter during the month of June, 1996. This greater area was agreed upon by representatives of the BLM, the project proponents, the USFWS, and the WGFD as an area large enough to provide a reasonable base from which to estimate cumulative impacts for the proposed project. The location of each nest found within the area was recorded with a global positioning system (GPS) receiver and is presented in a large scale map in the Wildlife Technical Report (Map 1, HWA 1996). A reduced version of this map is illustrated in Figure 5-2. This survey area, known as the Greater Cave Gulch Raptor Analysis Area (GRAA), includes the Cooper Reservoir, Boone Dome, Cave Gulch-Bullfrog-Waltman, Clark Ranch, Tepee Flats, Rochelle Ranch, Notches Dome, and Okie Draw well fields.

Analyses were conducted over the GRAA in an effort to place the assessment of cumulative project-related disturbances into a larger perspective. Although the survey was conducted too late

CHAPTER 5: CUMULATIVE IMPACTS ANALYSIS

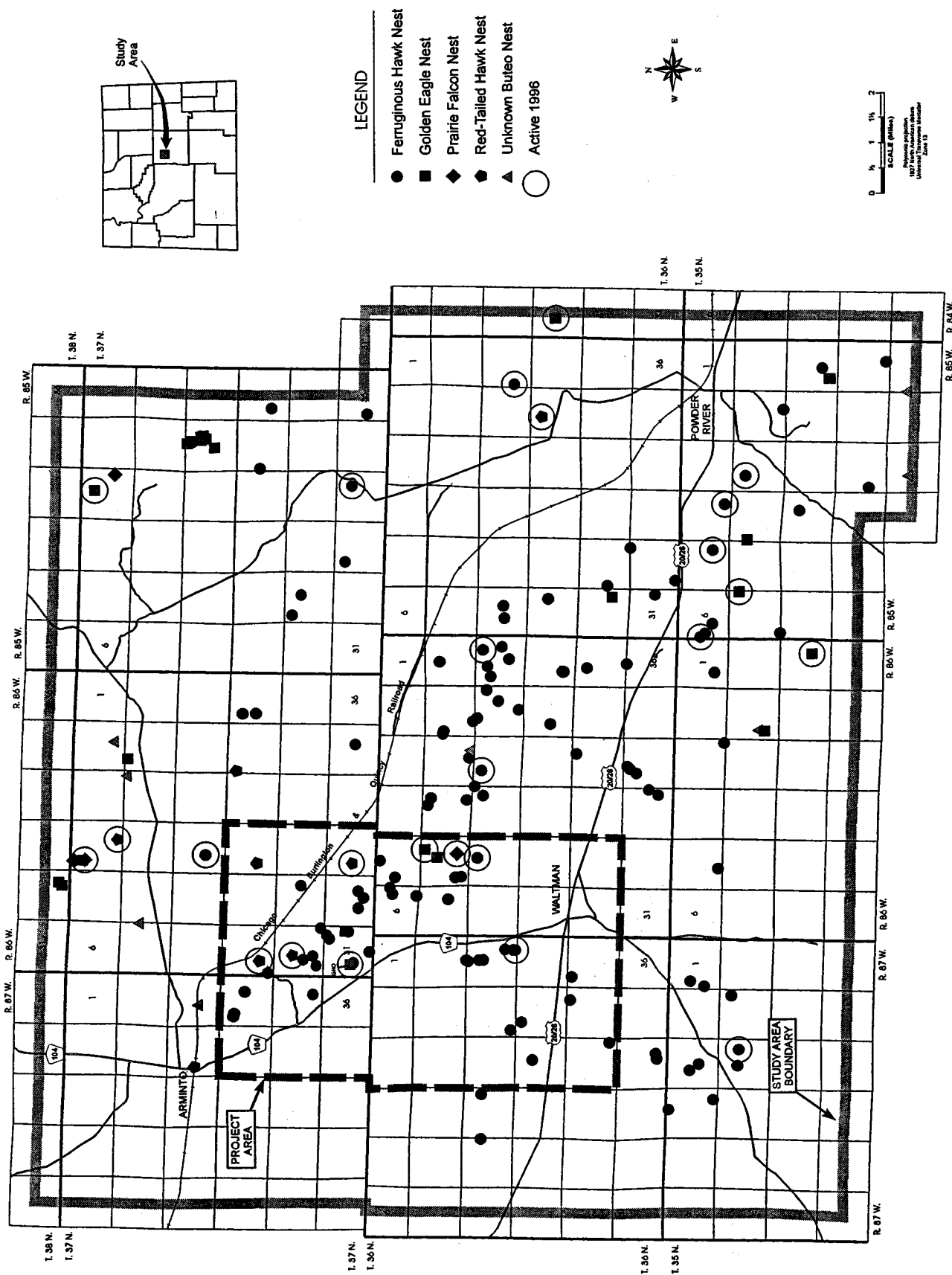


Figure 5-2. Raptor Nest Locations and Status within the Greater Cave Gulch Analysis Area.

CHAPTER 5: CUMULATIVE IMPACTS ANALYSIS

to document early nesting attempts and failures, results of this survey provided a comprehensive record of nesting activities for 1996 in that, except for the great horned owl, none of the species documented were likely to have fledged young by the time of the survey.

An inventory of raptor prey populations was also conducted on the GRAA during 1996 in order to establish a base from which to measure future deviations so that raptor production in this area can be compared to prey base production over time. Both lagomorph (jack rabbits and cottontail rabbits) and rodent (ground squirrels, prairie dogs, and to a lesser extent, smaller rodents) populations were inventoried along 55 miles of ground transects (HWA 1996).

Additional information utilized in the analysis of cumulative affects includes data assembled by BLM's Resource Management Group (RMG) in the Casper District Office. These data consist of land ownership grids, existing well locations, and road networks within the GRAA.

Data Collection Results

During the survey of the GRAA, 170 raptor nests, of 5 species, were located (Figure 5-2; Table F-2, Appendix F). Of the 170 nests, 71.8% (122) were those of ferruginous hawks, 15.9% (27) were those of golden eagles, 4.7% (8) were red-tailed hawk nests, 4 prairie falcon aeries were found (2.3%), one nest was occupied by a great-horned owl, and 8 nests could not be identified or associated with any particular species (Table 5-5). Nest densities of the two most common species, the ferruginous hawk and golden eagle, averaged 0.45 and 0.10 nests per square mile, respectively.

As shown in Tables 5-5 and 5-6, there were no occupied ferruginous hawk nests on the project area at the time the June survey was performed, but 9 were found on the surrounding 233 square miles (0.04 nests/square mile). The densities of occupied red-tailed hawk and golden eagle nests were greater on the project area than on the surrounding 233 square-mile area (Table 5-6). No comparison of prairie falcon aeries or great horned owl nests was made because of the difficulty in obtaining total counts of these species in a single fly-over. Although it is known from earlier survey data for the project area that two ferruginous hawk nests and two red-tailed hawk nests were active and failed during 1996, these nests were not included in the comparison of areas on the GRAA because there was no evidence of their occupancy at the time of the June survey. Since it is likely that other nests on the GRAA outside of the project area also showed no signs of earlier occupancy at the time of the June survey, only the June survey results were used to compare areas. Data on productivity or fledging are not available.

A relatively small proportion of the total nests found on the GRAA were occupied during the June 19-20, 1996 survey: 7.3% (9) of ferruginous hawk nests, 18.55% (5) of golden eagle nests, and 37.5% (5) of red-tailed hawk nests (Table 5-5). The percentages calculated for prairie falcon and great horned owl nests are probably not representative because of the difficulty in obtaining accurate surveys of these species in a single fly-over. Based on survey results of prey base on the GRAA, these low nest occupancy rates are thought to be a function of low prey base populations on the GRAA during 1996. The higher occupancy rate in golden eagles is thought to be due to the fact that lagomorph populations, which eagles rely heavily on, were relatively higher than ground squirrel populations, which ferruginous hawks rely heavily on.

Table 5-5. Number and Status of Raptor Nests within the Greater Cave Gulch Raptor Analysis Area (GRAA) during June 19-20, 1996.

Raptor Species	Nests ¹													
	Total							Occupied						
	Number			Percent ²				Number				Percent ³		
	GRAA ⁴	GRAA-PA ⁵	PA ⁶	GRAA	GRAA-PA	PA		GRAA	GRAA-PA	PA		GRAA-PA	GRAA	PA
Ferruginous Hawk	122	80	42	71.8	67.8	80.8		9	9	0		11.2	7.3	0.0
Golden Eagle	27	23	4	15.9	19.5	7.7		5	4	1		17.4	18.5	25.0
Red-tailed Hawk	8	4	4	4.7	1.7	7.7		3	2	1		50.0	37.5	25.0
Prairie Falcon	4	3	1	2.3	1.3	2.5		2	1	1		33.3	50.0	100.0
Great Horned Owl	1	0	1	0.6	0.0	2.5		0	0	1		--	0.0	100.0
Unknown Buteo	8	8	0	4.7	3.4	0.0		0	0	--		0.0	0.0	--
Grand Total	170	118	52	100.0	100.0	100.0		19	16	4		13.6 ²	11.2 ²	7.7 ²

¹ Occupied - At least one egg laid or bird in incubating position.

² Percent of Grand Total.

³ Percent of species total.

⁴ Greater Raptor Analysis Area - 273 sq. mi. area.

⁵ Greater Raptor Analysis Area excluding the project area - 233 sq. mi. area.

⁶ Project Area - 40 sq. mi. area.

CHAPTER 5: CUMULATIVE IMPACTS ANALYSIS

Table 5-6. Numbers of Occupied Raptor Nests Observed on the Project Area and The Surrounding Greater Cave Gulch Raptor Analysis Area (GRAA) During the June 1996 Helicopter Survey.

	Project Area (40 sq. mi.)		Greater Raptor Analysis Area ¹ (233 sq. mi.)	
	Number of Nests Occupied	Number of Occupied Nests per sq. mi.	Number of Nests Occupied	Number of Occupied Nests per sq. mi.
Ferruginous Hawk	0	0.0	9	0.04
Red-tailed Hawk	1	0.025	2	0.01
Golden Eagle	1	0.025	4	0.017
Prairie Falcon	1	--	1	--
Great Horned Owl	1	--	0	--

¹ The GRAA is a 273-sq. mile area consisting of the 40-sq. mile project area plus 233 miles surrounding the project area (Figure 5-2).

Data provided by the RMG indicate that 14.1 percent of the land surface within the GRAA is owned by the State of Wyoming, 26.0 percent is owned by the BLM, and 59.9 percent is in private ownership. A total of 272 oil and gas wells, 590 miles of secondary, county, and unimproved roads, and railroads, and 627 miles of 2-track roads occur within the 273 square-mile GRAA area. A total of 3,175 acres of existing disturbance occur on the GRAA. An additional 19 new wells in the Cooper Reservoir Field and 1 in the Boone Dome Field have been proposed or are in progress.

Proposed Action

Under the Proposed Action, the 107 new well pads proposed would increase the number of oil and gas well pads within the GRAA by 39.3 percent (Table 5-7) and would reduce the amount of undisturbed surface in the GRAA by 0.23 percent. The Proposed Action of the Cave Gulch-Bullfrog-Waltman Project, in combination with other proposed development in the Cooper Reservoir and Boone Dome Fields, would increase the number of oil and gas well pads within the GRAA by 46.7 percent and would collectively reduce the amount of undisturbed surface in the GRAA by 0.27 percent. This would result in an overall reduction of undisturbed surface in the GRAA of 2.07 percent (1.8 percent existing plus 0.27 percent proposed). Based on the Proposed Action of the project, it is estimated that from 3 to 7 pairs of raptors would be displaced (Table 5-7; Table 4-18).

Alternative A

Under Alternative A, the 99 new well pads proposed would increase the number of oil and gas well pads within the GRAA by 36.4 percent (Table 5-7) and would reduce the amount of undisturbed surface in the GRAA by 0.18 percent. The implementation of Alternative A, in combination with other proposed developments in the Cooper Reservoir and Boone Dome Fields, would increase the number of oil and gas well pads within the GRAA by 43.7 percent and would collectively reduce the amount of undisturbed surface in the GRAA by 0.22 percent. This would result in an overall reduction of undisturbed surface in the GRAA of 2.02 percent (1.8 percent existing plus 0.22

Table 5-7. Cumulative Impacts to Raptors on the Greater Cave Gulch Raptor Analysis Area (GRAA)¹.

Alternative	Number of Oil and Gas Wells			Acres of Unreclaimed Surface Dist.		Percent Reduction of Existing Undisturbed Surface in the GRAA ²		Number of Raptor Pairs Displaced	
	Proposed Well Sites	Existing Well Sites	Percent Increase	Proposed ³	Existing	Proposed	Existing	without ANSs	with ANSs
Proposed Action	107	272	39.3	394	3,175	0.23	1.8	7	0
Alternative A	99	272	36.4	307	3,175	0.18	1.8	3	0
Alternative B	114	272	41.9	348	3,175	0.20	1.8	7	0
Alternative C	107	272	39.3	394	3,175	0.23	1.8	7	0

¹ The GRAA consists of 273 square miles surrounding and including the 40 square-mile project area.

² Based on 171,595 total acres of existing undisturbed surface in the GRAA.

³ An additional 70 acres of unreclaimed surface disturbance will result from proposed wells in the Cooper Reservoir and Boone Dome Fields.

CHAPTER 5: CUMULATIVE IMPACTS ANALYSIS

ercent proposed). Based on the implementation of this alternative, it is estimated that from 0 to 3 pairs of raptors would be displaced (Table 5-7; Table 4-18).

Alternative B

Under Alternative B, the 114 new well pads proposed would increase the number of oil and gas well pads within the GRAA by 41.9 percent (Table 5-7) and would reduce the amount of undisturbed surface in the GRAA by 0.20 percent. The implementation of Alternative B, in combination with other proposed developments in the Cooper Reservoir and Boone Dome fields, would increase the number of oil and gas well pads within the GRAA by 49.3 percent and would collectively reduce the amount of undisturbed surface in the GRAA by 0.24 percent. This would result in an overall reduction of undisturbed surface in the GRAA of 2.04 percent (1.8 percent existing plus 0.24 percent proposed). Based on the adoption of this alternative, it is estimated that from 3 to 7 pairs of raptors would be displaced (Table 5-7; Table 4-18).

Alternative C

Under Alternative C, it is possible that the same number of well pads would be constructed as under the Proposed Action (107). If this were to occur, it would increase the number of oil and gas well pads within the GRAA by 39.3 percent (Table 5-7) and would reduce the amount of undisturbed surface in the GRAA by 0.23 percent. Probable actions under Alternative C, in combination with other proposed actions in the Cooper Reservoir and Boone Dome Fields, would increase the number of oil and gas well pads within the GRAA by 45.6 percent and would collectively reduce the amount of undisturbed surface in the GRAA by 0.26 percent. This would result in an overall reduction of undisturbed surface in the GRAA of 2.06 percent (1.8 percent existing plus 0.26 percent proposed). Based on the probable actions under Alternative C, it is estimated that from 3 to 7 pairs of raptors would be displaced (Table 5-7; Table 4-18).

The main cumulative impact under any of the alternatives would be the displacement of raptor pairs from nest sites.

Summary and Discussion

The success of raptor nesting and productivity are affected by: (1) prey base availability, and (2) nesting opportunity, which is determined by the availability of sui nesting structures and required levels of security from predation and general disturbance.

It appears that with the low rate of occupancy of existing nests that was found during the 1996 survey, that the availability of nest sites and territories did not limit raptor production on the GRAA during 1996. The nine occupied ferruginous hawk nests found on the 273 square-mile area accounts for only one territory per 30.3 square miles. During years of good prey base availability raptors tend to reduce required territory size. When both prey base and sui nesting structures are available, ferruginous hawks have been known to maintain territories as small as several square miles (Call 1994). Territories of 5 to 10 square miles are more typical during average prey base conditions. Based on the results of the 1996 prey base survey, it would appear that the low density of productive raptor territories on the GRAA is due to the relatively low prey base there and that prey base availability is currently limiting raptor production.

CHAPTER 5: CUMULATIVE IMPACTS ANALYSIS

Prey base density and availability are not likely to be reduced significantly as a result of land clearing activities associated with the Cave Gulch-Bullfrog-Waltman Project and proposed actions of other projects for three reasons. First, impacts produced by these activities will be dispersed over a large area and staggered over a 10-year period with relatively small amounts of total disturbance occurring during a single year. Second, numerous alternative prey base habitats in the extensive 273-square-mile area will remain undisturbed. As shown in Table 5-7, most of the surface area within the GRAA (171,121 to 171,238 acres or 98 percent) will remain in an undisturbed or reclaimed condition following project development. Third, the recolonization of early successional forbs that rapidly follows reclamation of disturbed areas will attract a number of prey species (ground squirrels and lagomorphs) and contribute to prey base diversity and density. Prey base, as controlled by natural variations in regional climatic patterns, probably has the greatest overall controlling effect on raptor production success and density.

It is estimated that up to seven pairs of raptors may be displaced from the project area by the Proposed Action, Alternative B, and Alternative C, while Alternative A would displace up to three pairs (Table 4-18). The displacement of these pairs would result in a loss of production by these pairs in that there is a finite quantity of sui nesting areas on the GRAA in relation to any given prey base level. As prey base populations increase and more raptor territories are established the availability of sui natural nesting structures may become the factor limiting raptor production on the GRAA. Under these circumstances, the placement of elevated ANSs in sui locations would help increase production by: (1) making nesting sites available in otherwise sui areas where no natural structures exist, and (2) protecting eggs and young from ground predators. Therefore, as previously described in Section 4.7.3.1.4, the placement of two ANSs for every pair displaced would help to minimize and eliminate potential long-term impacts under the Proposed Action and Alternatives B and C. Short-term impacts to the golden eagle pair utilizing nests 2 & 20, however, would persist for several years until the pair adapted to and accepted an ANS. Given adequate availability of prey species, displaced ferruginous hawks would be expected to accept properly located ANSs during the first year (Call 1994).

Given the application of mitigative procedures described in Sections 4.7.5.2 and 2.2.2.11, it is likely that no significant long-term cumulative impact to raptor population production on the GRAA will result from the implementation of any of the alternatives. Under the Proposed Action and Alternatives B and C, a short-term impact to the golden eagle pair using nests 2 & 20 is likely to occur because of the adaptation time required by this species to adapt to and utilize ANSs. Effective placement of ANSs may increase raptor production over the long-term to higher levels than existed prior to development. Monitoring should be conducted as necessary to insure the success of mitigation measures.

5.9 VISUAL RESOURCES

As discussed in Chapter 3, existing visual qualities in the area have already been substantially affected by decades of oil and gas development, road building, power lines, an electrical substation, a junk yard, ranch out-buildings, and a railroad grade which are all visible to motorists and recreationists. Surface facilities introduced by the Proposed Action and project alternatives would increase the number of facilities visible in the area. Some local, cumulative changes in visual quality would occur. However, the cumulative impact of proposed and existing development on visual resources would still be consistent with the current VRM Class 4 designation. The only

CHAPTER 5: CUMULATIVE IMPACTS ANALYSIS

site specific exception would be the liquids recovery plant included in the Proposed Action and Alternatives A and B, which would produce significant impacts.

5.10 RECREATION

BLM does not have statistics on historical use of the project area by recreation groups which could be used to determine trends in cumulative impacts on recreation use and displacement. However, it is likely that oil and gas development in the project area first began displacing an unknown number of recreation users when it began several decades ago. Considering the level of existing oil and gas activity in the project area and the availability of higher quality recreation opportunities in the region, current recreation use of the project area is likely to be low. Installation of interpretive facilities would help to direct recreation users to other recreation opportunities. However, continued development would likely displace any remaining recreation use from the project area itself with the exception of users passing through the area on their way to a recreation destination or recreation users who would use oil and gas roads for motorized recreation activities such as trailbike riding.

No reliable data on recreation use of the first nine miles of the County Road 104--the South Bighorn/Redwall National Backcountry Byway--is available which could be used to help determine the cumulative impact of increased visual impacts on recreation use of this road. However, the presence of the proposed development at the beginning of the road in an area of existing development--rather than near the recreation destination (the Bighorn Mountains)--would reduce its potential, cumulative impact on recreation users as would implementation of mitigation measures discussed in chapter four.

5.11 CULTURAL RESOURCES

Cultural resources on public land, including archaeological sites and historic properties, are protected by federal law and regulations. Current oil and gas operations must comply with these protective regulations and for decades BLM has required the completion of cultural resource inventories prior to surface-disturbing activities. These inventories have been used to identify sites potentially eligible for inclusion on the National Register of Historic Places and to identify sites which BLM has required past oil and gas activities to avoid.

Because Class III cultural resource inventories would be completed prior to proposed surface disturbance in areas not previously inventoried, the potential for increased impacts on cultural artifacts would be minimized. By avoiding known cultural and historical sites during the layout of drill sites, access roads and pipeline corridors, the potential for incremental increases in cumulative would be avoided. Where this is infeasible, the development of a data recovery and site mitigation plans would minimize cumulative impacts. Completion of cultural resource inventories would have a beneficial, cumulative impact on the level of cultural information about the project area. Some unintentional damage to subsurface resources could occur during grading or excavation activities. However, implementation of resource protection and mitigation measures described elsewhere in this EIS are intended to protect such resources upon discovery. Subsequent excavation, protection or recovery of such artifacts could have a positive impact on archeological data about prehistoric and historic use of the area.

CHAPTER 5: CUMULATIVE IMPACTS ANALYSIS

5.12 SOCIO-ECONOMICS

Oil and gas development in the project area already makes a positive impact on Natrona County, the State of Wyoming and the U.S. Treasury. Increased activity by the project proponents would produce positive, cumulative socio-economic impacts by increasing economic opportunities for local drilling and service firms, increasing employment opportunities, reducing the demand for public assistance, increasing spending in local economies by energy-related companies and workers, and by generating additional tax revenue for federal, state and local governments.

Proposed activities would have a positive, cumulative impact on government revenues at the federal, state and local levels. Over the life of the project, it is estimated that all project activities would have a positive, cumulative impact of \$297.0 million on government revenues.

The project could help slow a recent decline in local oil and gas industry activity and could help stabilize that sector of the local economy. However, seasonal constraints on oil and gas activity could exacerbate seasonal fluctuations in employment within the energy and service sectors which, in turn, would add to cumulative impacts on public assistance programs. No cumulative impacts on population, housing or most government services are expected to occur as the project proponents intend to use local workers who already are employed in the oil and gas industry. Given existing levels of unemployment (higher than the statewide average) and under-employment in the region, no labor shortages are expected from the combination of existing, proposed and reasonably foreseeable activities.

While the proposed project activities could result in a cumulative, increased demand for law enforcement and road maintenance services, the cost of such services would be offset by increased tax revenue. It is possible that the Proposed Action could contribute to a cumulative demand for natural gas drilling and service workers which could outstrip supply if several large natural gas projects occurred at the same time. For this reason, cumulative socioeconomic impacts from the combination of current, proposed and reasonably foreseeable development activities in Natrona and Fremont counties were considered. To date, known or reasonably foreseeable activities in the vicinity of proposed activities include the following:

- Cooper Reservoir (4 wells approved, 15 pending);
- Cedar Ridge (1 well approved, 1 pending);
- Wallace Creek (4 wells drilled, plans unknown);
- Madden (no change in current activity);
- Graham Reservoir (continue to drill about 3 wells per year);
- UMETCO Reclamation Project (on-going remediation project);
- KN Pony Express Pipeline (major work to be completed early 1997);
- Boone Dome field (one new well approved); and,
- Wildhorse Butte field (one new well approved).

The general location and a description of known development plans for these projects are listed below :

- The Cooper Reservoir unit is located less than one mile south of the CG-W-B project area. Interim development of 4 wells was approved and the wells have yet to be drilled. Field

CHAPTER 5: CUMULATIVE IMPACTS ANALYSIS

development plans (pending environmental analysis) include drilling 15 additional wells (Skillman 1997).

- The Cedar Ridge unit is located a 5-6 miles north of the CG-W-B project area. Only one well has been approved and another proposed well is pending completion of analysis by the BLM (Skillman 1997).
- The Wallace Creek unit is located 8-10 miles south of the CG-W-B project area. Four wells were drilled this year but are still in the confirmation stage. A meeting with the BLM is scheduled in January 1997 to discuss future field development (Skillman 1997).
- The Madden field is located about 10 miles northwest of the CG-W-B project area. The level of activity anticipated for the next 5 to 10 years in the Madden field should be similar to that of the last few years (Wright 1997).
- The Graham Reservoir unit is also located about 10 miles west of the CG-W-B project area. The field operator has drilled about 3 wells per year for the past few years and anticipates a similar level of activity for the next 5 to 10 years with possible increases in some years (Dresher 1997).
- The UMETCO Gas Hills uranium mine is located south of the CG-W-B project area near Rattlesnake Mountain. The company is in the process of remediation of buried tailings. A quarry has been proposed on the west end of the Rattlesnake Mountains to obtain rock to cover the tailings. UMETCO has been asked to prepare an EA on a 40-acre area for a possible 10-acre quarry.
- The KN Pony Express pipeline would connect the CG-W-B project area to KN's natural gas distribution system. Major construction work will be completed by February 1, 1997. The tie-in to the pipeline cannot be completed until FERC approval has been granted and that approval date is uncertain (Bloom 1997).

Other potential developments include the following:

- The BLM has approved an APD on a well in the Boone Dome field about 7 miles east of the CG-W-B project area (Skillman 1997).
- A well was recently permitted in the Wild Horse Butte field about 7 miles south of the CG-W-B project area (Skillman 1997).

The projects listed above would primarily employ the drilling and field service industry located in Casper and Riverton. The potential for cumulative socioeconomic impacts associated with these projects exists and is dependent on the following factors:

- natural gas market conditions,
- project economics,
- the pace and timing of development of each of the several projects,
- conditions in the oil and gas drilling and service industry at the time of development.

CHAPTER 5: CUMULATIVE IMPACTS ANALYSIS

The potential for negative cumulative impacts to occur would increase if substantial development in several or all of these projects were to occur simultaneously and exceed the capacity of the existing regional oil and gas service industry. Negative cumulative socioeconomic impacts could include the following:

- rapid population growth in communities near the project areas;
- demand for housing which exceeds the capacity of the local housing markets;
- demand for local government facilities and services which exceeds existing capacities.

Although the revenues associated with development of each of these Projects could be substantial, revenues might not be available to fund local government facility and service expansions in time to accommodate population growth associated with development.

The Proposed Action would contribute to cumulative, regional demand for natural gas drilling and service workers. Negative cumulative impacts could occur if substantial, unforeseen development in these other areas were to occur simultaneously with the proposed activities, and if the capacity of the local labor pool became strained. In this case negative, cumulative impacts would be most likely to occur in the Casper area, Shoshoni, Riverton and unincorporated communities in area such as Waltman, Powder River, Arminto, Lysite, Moneta, Natrona and Hiland. However, the possibility of this impact occurring is unknown due to the uncertainties about the feasibility, timing or scope of future activities in these other fields.

5.13 TRANSPORTATION

The remaining work on the Express Pipeline and the KN Energy Pony Express pipeline projects is not expected to overlap the proposed development. Thus potential cumulative impacts from the combination of the Proposed Action and these projects would be avoided. On-going natural gas exploration, development and production activities in the Cooper Reservoir, Cedar Ridge, Wallace Creek, Madden and Graham Reservoir fields (see Socio-economic section) are not expected to substantially increase current traffic volume on roads used to access the proposed project area. Future drilling activity in these fields would be sufficient to only maintain current traffic volume on area roads. In combination with the relatively small increase in traffic volume on paved roads associated with the Proposed Action or project alternatives, no cumulative transportation impacts--such as increased accident rates--are expected to occur. The excess capacity of paved roads which provide access to the area indicates that the proposed increase in traffic volume is unlikely to have a cumulative impact on service levels or road surfaces. While the project could create the need for minor maintenance work (e.g., signing), additional tax revenue generated by the project should cover the cost of such repairs. However, increased traffic on unpaved roads within the field would lead to cumulative impacts on road surfaces. The operators of the field would be responsible for implementing preventive and corrective maintenance of unpaved roads in the project area to address such impacts.

5.14 HEALTH AND SAFETY

Cumulative impacts on health and safety would be avoided or minimized by implementation of an SPCC plan, BLM regulations on drilling and the use of blow-out preventers, a hazardous materials

CHAPTER 5: CUMULATIVE IMPACTS ANALYSIS

safety plan and occupational safety measures as required by other federal regulations. Additional mitigation measures discussed in Chapter 4 to address other health and safety concerns would ensure that increased cumulative impacts on health and safety are avoided. A minor increase in the potential for vehicle-related accidents at construction sites would occur but overall accident rates on area roads are not expected to vary.

5.15 NOISE

The cumulative impact of construction and drilling activity and associated traffic on noise levels within the project area would depend upon the drilling schedule ultimately implemented. To illustrate, where drilling activity is fairly constant and spread out over 10 years, the cumulative impact of existing and proposed activities could result in a generalized increase in background noise level for the 10-year period. However, where drilling activity and construction activity is concentrated in a 2-3 year period, a "spike" in background noise levels would be experienced but would be followed by a return to background levels similar to those for a partially developed rural area (about 40 dBA).

The combination of existing and proposed production activities would result in a generalized increase in background noise levels but the magnitude and geographic distribution of this impact would be uneven. Areas of more intensive activity (wells on 20 and 40 acre spacing, the liquids recovery plant) are likely to have an increase in cumulative, background noise levels, in part, due to the concentration of traffic noise. Areas of lower well density (e.g., 160, 320 or 640 acre spacing) may see little cumulative change in background noise levels once drilling has been completed and wells are operational. However, at some specific locations, a cumulative increase in noise would be evident especially if a centralized compression facility were nearby.

Continuous noise would result from ongoing construction, drilling, and gas production operations during the life of the project. Increased traffic on existing roads would add to existing traffic noise. This noise would be concentrated in the daylight hours. And given the low current and anticipated traffic volumes, and dispersed nature of traffic and gas production operations within the project area, the projected additions to cumulative, traffic-related noise impacts are expected to be slight.

5.16 SUMMARY OF COMPARATIVE AND CUMULATIVE IMPACTS

A comparison of project alternatives and their effect on cumulative impacts is found in Table 5-8 which follows. Cumulative impacts would include short-term and long-term impacts. Impacts associated with construction activities would be short-term in areas which would be reclaimed--such as all pipeline corridors and portions of drilling pads not needed for production activities. Long-term, cumulative impacts would be associated with disturbance of areas needed for production activities such as tank batteries, production locations and roads.

CHAPTER 5: CUMULATIVE IMPACTS ANALYSIS

Table 5-8. Summary of Comparative and Cumulative Impacts.

RESOURCE ELEMENT	PROPOSED ACTION	ALTERNATIVE		
		A Seasonal Limits	B Key Raptor Area	C No Action
GENERAL				
Number of Well Pads	107	99	114	Current + UAD
New Road ¹	66 miles	47 miles	53 miles	Current + UAD
New Disturbance -- total -- after reclamation	788 acres 394 acres	670 acres 307 acres	769 acres 348 acres	1,041 acres+ UAD 452 acres + UAD
Current Disturbance -- total -- after reclamation	1,041 acres 452 acres	1,041 acres 452 acres	1,041 acres 452 acres	1,041 acres 452 acres
Cumulative Disturbance -- total -- after reclamation	1,829 acres 846 acres	1,711 acres 759 acres	1,810 acres 800 acres	1,041 acres+ UAD 452 acres + UAD
GEOLOGIC HAZARDS MINERALS PALEONTOLOGY	NSI w/mitigation ²	NSI w/mitigation	NSI w/ mitigation	Potential SI
Compliance with RMP	YES	YES	YES	YES
Potential for Loss of Fossils of Scientific Value	Low w/mitigation	Low w/mitigation	Low w/mitigation	UNKI
Potential for Geologic Hazards	Low	Low	Low	Low
AIR QUALITY	NSI	NSI	NSI	NSI
Compliance with RMP and FLMPA	YES	YES	YES	YES
Worst-Case Cumulative Emissions: Compliance with WAAQS and NAAQS	YES	YES	YES	YES
Worst Case Visibility Reduction: Cloud Peak Class II Wilderness	0.45 deciview	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action
Worst Case Change in lake ANC: Cloud Peak Class II Wilderness	0.02%	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action
Below USDA-Forest Service criteria for unaccep change in ANC	YES	YES	YES	YES
Below USDA-Forest Service criteria for unaccep change in visibility	YES	YES	YES	YES

CHAPTER 5: CUMULATIVE IMPACTS ANALYSIS

RESOURCE ELEMENT	PROPOSED ACTION	ALTERNATIVE		
		A Seasonal Limits	B Key Raptor Area	C No Action
Below BLM criteria for potential unaccep change in visibility	YES	YES	YES	YES
SOILS	NSI w/mitigation	NSI w/mitigation	NSI w/mitigation	NSI w/mitigation
Watershed where 10% Disturbance Threshold Exceeded -- short-term	Main Branch Cave Gulch, Waltman Draw	Similar to Proposed Action	Similar to Proposed Action	UNKI
Watershed where 10% Disturbance Threshold Exceeded -- long-term	None	None	None	None likely
Compliance with RMP	YES w/mitigation	YES w/mitigation	YES w/mitigation	YES w/mitigation
Cumulative, Short-term Disturbance to Sensitive Soils	1,182 acres	959 acres	1,038 acres	633 acres + UAD
Soil Erosion - Year 5 with Best Management Practices	Insignificant <0.5 tons/ac/year	Insignificant <0.5 tons/ac/year	Insignificant <0.5 tons/ac/year	UNKI
Cumulative Disturbance Prior to Reclamation	1,829 acres	1,711 acres	1,808 acres	1,041 acres +UAD
Cumulative Disturbance With Reclamation	846 acres	759 acres	800 acres	452 acres +UAD
Added Erosion: Year 1: w/o BMPs w/ BMPs	19,856 tons/year 1,443 tons/year	16,545 tons/year 1,212 tons/year	19,001 tons/year 1,390 tons/year	Current + UAD Current + UAD
Added Erosion: Year 5: w/o BMPs w/ BMPs	4,482 tons/year 290 tons/year	3,736 tons/year 243 tons/year	4,289 tons/year 278 tons/year	Current + UAD Current + UAD
Compliance with EO 11987 (reclamation)	YES	YES	YES	YES
Revegetation Potential	Poor to good, depends on site-specific conditions	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action
WATER RESOURCES	NSI w/mitigation	NSI w/mitigation	NSI w/mitigation	Potential SI w/out mitigation
Compliance with RMP	YES	YES	YES	YES
Compliance with federal, state water quality standards	YES	YES	YES	YES

CHAPTER 5: CUMULATIVE IMPACTS ANALYSIS

RESOURCE ELEMENT	PROPOSED ACTION	ALTERNATIVE		
		A Seasonal Limits	B Key Raptor Area	C No Action
Total water use	230 acre-feet	230 acre-feet	231 acre-feet	Current + UAD
Potential for increased stream sedimentation	Low w/mitigation	Low w/mitigation	Low w/mitigation	UNKI
Degradation potential; usable/ po groundwater	Low	Low	Low	Low
Impact on water supplies	Low	Low	Low	Low
VEGETATION & WETLANDS	NSI w/mitigation	NSI w/mitigation	NSI w/mitigation	NSI w/mitigation
Compliance with RMP	YES	YES	YES	YES
Compliance with CWA Section 404, EOs 11990 (wetlands) and 11988 (floodplains)	YES	YES	YES	YES
Potential Impact to Plant Communities of Concern	Low w/mitigation	Low w/mitigation	Low w/mitigation	UNKI
Construction Impacts by Vegetation Type Mixed Desert Shrub Alkali Bottomland Badlands Wetlands	85% 1% 13% 1%	Same as Proposed Action	Same as Proposed Action	NA
RANGE RESOURCES	NSI	NSI	NSI	NSI
Compliance with RMP	YES	YES	YES	YES
AUMs Lost Per Year --short-term --long-term (with reclamation, % total)	92.8 46.35 (1.57%)	78.82 36.12 (1.22%)	90.44 40.99 (1.39%)	UAD
WILDLIFE	NSI w/mitigation	NSI w/mitigation	NSI w/mitigation	UNKI
Compliance with RMP, FWS, and WGFD objectives and stipulations	YES	YES	YES	YES
Pronghorn Habitats Cum. Disturbance Prior to Reclamation	NSI	NSI	NSI	NSI
Yearlong	1,108	992.5	1,088	Similar to Proposed Action
Winter/yearlong	132	129.5	133	
After Reclamation:				
Yearlong	745	662	701	
Winter/yearlong	101	97	99	

CHAPTER 5: CUMULATIVE IMPACTS ANALYSIS

RESOURCE ELEMENT	PROPOSED ACTION	ALTERNATIVE		
		A Seasonal Limits	B Key Raptor Area	C No Action
Mule Deer Habitat Cum. Disturbance Winter/yearlong Before reclamation After reclamation	NSI 962 603.5	NSI 848 521	NSI 914 548	Similar to Proposed Action
Loss of Potential Sage Grouse Habitat	NSI	NSI	NSI	NSI
Endangered Species Act: Impact on Federally-Listed Species Black-Footed Ferret Swift Fox Mountain Plover	NSI-NLTAA NSI-NLTAA w/mitigation NSI-NLTAA	NSI-NLTAA NSI-NLTAA w/mitigation NSI-NLTAA	NSI-NLTAA NSI-NLTAA w/mitigation NSI-NLTAA	NSI-NLTAA NSI-NLTAA w/mitigation NSI-NLTAA
Impact on Raptors	NSI w/mitigation	NSI	NSI w/mitigation	UKNI
RECREATION	SI	SI	SI	UKNI
Compliance with RMP	YES	YES	YES	YES
Displacement of Recreation Use	Complete for non- motorized	Complete for non- motorized	Complete for non- motorized	UNKI
Impact on Scenic Recreation Destinations	None	None	None	None
VISUAL RESOURCES	Localized SI	Localized SI	Localized SI	UNKI
Compliance with RMP	YES	YES	YES	UNKI
Compliance with BLM VRM Class IV	YES	YES	YES	UNKI
CULTURAL RESOURCES	NSI w/ mitigation	NSI w/ mitigation	NSI w/mitigation	NSI w/ mitigation
Compliance with RMP	YES	YES	YES	YES
Compliance with NRHP guidelines	YES	YES	YES	YES
Potential Impacts to Cultural Resources	Low w/ mitigation	Low w/ mitigation	Low w/ mitigation	Low w/mitigation

CHAPTER 5: CUMULATIVE IMPACTS ANALYSIS

RESOURCE ELEMENT	PROPOSED ACTION	ALTERNATIVE		
		A Seasonal Limits	B Key Raptor Area	C No Action
SOCIOECONOMICS	Positive	Less than Proposed Action	Less than Proposed Action	UNKI
Compliance with RMP, federal minerals policy	YES	Potential loss of leased, recoverable gas reserves	Potential loss of leased, recoverable gas reserves in Key Raptor Area	UNKI
Employment Rate	Positive increase	Seasonal unemployment	Similar to Proposed Action	UNKI
Primary Job Creation (for 10 years)	172 Full-time Equivalent	Less than 172 FTE and seasonal rather than year-round jobs	Similar to Proposed Action	UNKI
Secondary Job Creation	120-241 Full-time Equivalent	Less than 120-241 but seasonal rather than year round jobs	Similar to Proposed Action	UNKI
Annual Income Effect	\$12.4 million	Less than Proposed Action	Similar to Proposed Action	UNKI
Demand for Government Services	Slight increase for certain services	Seasonal fluctuations	Similar to Proposed Action	UNKI
Sales/Use Tax Revenue (10 year total) -- Total -- To Natrona County	\$2.9 million \$1.2 million	Slightly less than Proposed Action	Similar to Proposed Action	UNKI
State Severance Tax Revenue (life of project)	\$63.0 million	\$3.6 Million less than Proposed Action	Similar to Proposed Action but UNKI for Key Raptor Area leases	UNKI
State Mineral Royalties (life of project)	\$6.0 million	Similar to Proposed Action	Similar to Proposed Action but UNKI for Key Raptor Area leases	UNKI
Federal Mineral Royalties (life of project)	\$152.0 million	\$8.6 million less than Proposed Action	Similar to Proposed Action but UNKI for Key Raptor Area leases	UNKI
Federal Royalties Returned to the State (life of project)	\$76.0 million	\$4.3 million less than Proposed Action	Similar to Proposed Action but UNKI for Key Raptor Area leases	UNKI
Natrona County: Total Ad Valorem Revenue (life of project)	\$76.0 million	\$4.3 million less than Proposed Action	Similar to Proposed Action but UNKI for Key Raptor Area leases	UNKI

CHAPTER 5: CUMULATIVE IMPACTS ANALYSIS

RESOURCE ELEMENT	PROPOSED ACTION	ALTERNATIVE		
		A Seasonal Limits	B Key Raptor Area	C No Action
TRANSPORTATION	NSI	NSI	NSI	UNKI
Compliance with RMP	YES	YES	YES	YES
Traffic Volume Increase	2.1%	4.2% Seasonal	Similar to Proposed Action	Current + UAD
Compatible with Existing Service Levels	YES	YES	YES	UNKI
Measurable increase in accident rates	None	None	None	UNKI
New Roads	66 Miles	47 Miles	53 Miles	UNKI
HEALTH & SAFETY	NSI w/mitigation	NSI w/mitigation	NSI w/mitigation	NSI w/mitigation
Compliance with RMP	YES	YES	YES	YES
NOISE	NSI	NSI	NSI	NSI
Compliance with RMP	No standards specified in leases	No standards specified in leases	No standards specified in leases	No standards specified in leases
Average Background Noise Levels -- Drilling	Increase within a 0.5 mile radius	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action
Increase in Average Background Noise Levels --Production	0 to 10+ dBA depending upon location, facility	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action
NOTES: <ol style="list-style-type: none"> Pipelines would be placed in a combination road-pipeline right-of-way or in a pipeline right-of-way. Placement in a combination road-pipeline right-of-way would reduce total disturbance. All pipeline rights-of-way would be reclaimed. "With mitigation" includes resource protection measures incorporated into the Proposed Action, required under the BLM RMP for the Platte River Resource Area and mitigation measures specifically identified in Chapters 2 and 4. 				
ABBREVIATIONS				
ADT - Average daily traffic ANC - Acid Neutralizing Capacity AUM - Animal Unit Month CWA - Clean Water Act EO - Executive Order ESA - Endangered Species Act FLPMA - Federal Land Policy Management Act FWS - U.S. Fish and Wildlife Service NA - Not applicable NSI - No significant impacts NLTAA - Not likely to adversely affect RMP - Resource Management Plan ROW - Right of Way		SI - Significant impacts UAD - Unquantified additional development UNKI - Unknown impact until alternative activities and locations are proposed VRM - Visual Resource Management WGFD - Wyoming Game and Fish Department w/ - with w/l - within w/o - without $\mu\text{g}/\text{m}^3$ - micrograms per cubic meter		